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Flooding and subsidence in the Thames Gateway: impact on insurance loss potential

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In the UK, household buildings insurance generally covers loss and damage to the insured property from a range of natural and human perils, including windstorm, flood, subsidence, theft, accidental fire and winter freeze. Consequently, insurers require a reasoned view on the likely scale of losses that they may face to assist in strategic planning, reinsurance structuring, regulatory returns and general risk management. The UK summer 2007 flood events not only provided a clear indication of the scale of potential losses that the industry could face from an individual event, with £3 billion in claims, but also identified a need for insurers and reinsurers to better understand how events may correlate in time and space, and how to most effectively use the computational models of extreme events that are commonly applied to reflect these correlations. In addition to the potential for temporal clustering of events such as windstorms and floods, there is a possibility that seemingly uncorrelated natural perils, such as floods and subsidence, may impact an insurer's portfolio. Where aggregations of large numbers of new properties are planned, such as in the Thames Gateway, consideration of the potential future risk of aggregate losses due to the combination of perils such as subsidence and flood is increasingly important within the insurance company's strategic risk management process.

Whilst perils such as subsidence and flooding are generally considered independent within risk modelling, the potential for one event to influence the magnitude and likelihood of the other should be taken into account when determining risk level. In addition, the impact of correlated, but distinctive, loss causing events on particular property types may be significant, particularly if a specific property is designed to protect against one peril but is potentially susceptible to another. We suggest that flood events can lead to increased subsidence risk due to the weight of additional water and sediment, or rehydration of sediment under flood water. The latter mechanism may be particularly critical on sites where Holocene sediments are currently protected from flooding and are no longer subsiding. Holocene deposits tend to compress, either under their own weight or under a superimposed load such as made ground, built structures or flood water. If protected dry sediments become flooded in the future, subsidence would be expected to resume.

This research project aims to investigate the correlation between flood hazards and subsidence hazards and the effect that these two sources of risk will have on insurance losses in the Thames Gateway. In particular, the research will explore the potential hydrological and geophysical drivers and links between flood and subsidence events within the Thames Gateway, assessing the potential for significant event occurrence within the timescales relevant to insurers. In the first part of the project we have identified flood risk areas within the Thames Gateway development zone which have a high risk of flooding and may be affected by renewed or increased subsidence. This has been achieved through the use of national and local-scale 2D and 3D geo-environmental information such as the Geosure dataset (e.g. swell-shrink, collapsible and compressible deposits data layers), PSI data, thickness of superficial and artificial land deposits, and flood potential data etc. In the second stage of the project we will investigate the hydrological and geophysical links between flooding and subsidence events on developed sites; quantify the insurance loss potential in the Thames Gateway from correlated flooding and subsidence events; consider how climate change will affect risk to developments in the Thames Gateway in the context of subsidence and flooding; and develop new ways of communicating and visualise correlated flood and subsidence risk to a

range of stakeholders, including the insurance industry, planners, policy makers and the general public.